

Resolution of the *Thelymitra variegata* (Orchidaceae) complex of southern Australia and New Zealand

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Introduction

Thelymitra J.R.Forst. & G.Forst. is a complex genus of orchids consisting of about 100 described species, several described natural hybrids and at least 13 undescribed taxa. It is concentrated in higher rainfall areas of temperate Australia, but a few species occur in tropical north-eastern Australia, about 20 species occur in New Zealand (15 endemic) and a few species occur in Indonesia, New Caledonia, New Guinea and the Philippines.

This is one of a series of papers by the author reviewing the various morphologically distinct groups or complexes within *Thelymitra*. During the course of my studies of the *Thelymitra variegata* (Lindl.) F.Muell. complex it became evident that several undescribed species were present within the group. I take this opportunity to describe these new species and review the entire complex.

There are a number of morphological features that, in combination, distinguish members of the *T. variegata* complex from all other *Thelymitra* species. The leaf is usually variously auriculate at the base and the blade is usually spirally twisted or at least somewhat curved. The leaf is also pubescent at the base with the hairs mainly on the veins and margins. The flowers usually have strong lustrous colours, often in combinations of pink, red, yellow, mauve or purple. The column has a rudimentary post-anther lobe with an arc of small digitate to globose glands arranged between the bases of the lateral lobes. The lateral lobes are well-developed and prominent, stipitate, suborbicular to narrow-elliptic and smooth to rugulose. The anther has an elongate terminal beak that is essentially an extension of the connective (see Fig. 1). Although six of the eight species in the complex are apparently insect-pollinated, it is interesting to note that no floral odours have ever been attributed to the group. The likely mechanism for pollination is floral mimicry of other wildflowers (A. Brown pers. comm.)

Abstract

The eight currently known taxa in the *Thelymitra variegata* (Lindl.) F.Muell. complex are reviewed and descriptions are presented for each. *Thelymitra pulcherrima* Jeanes, *T. speciosa* Jeanes and *T. uliginosa* Jeanes from southwestern Western Australia are described as new and illustrated. *Thelymitra spiralis* (Lindl.) F.Muell. var. *pulchella* Nicholls is raised to species rank and given the new name *T. maculata* Jeanes as the epithet 'pulchella' is unavailable. The key diagnostic features relating to the size and colour of the perianth, the size, colour and shape of the lateral lobes of the column and leaf characteristics are elucidated. Information on distribution, habitat, pollination biology, flowering time and conservation status is given for all eight taxa. The main distinguishing features of *Thelymitra apiculata* (A.S. George) M.A.Clem. & D.L.Jones, *T. matthewsii* Cheesem., *T. spiralis*, *T. variegata* and the four new species are tabulated. A key is provided to distinguish all eight members of the *T. variegata* complex.

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Taxonomic history

The first two species in the group to be recognised, *Thelymitra variegata* and *T. spiralis* (Lindl.) F.Muell., were described by Lindley (1839–40) as *Macdonaldia variegata* Lindl. and *M. spiralis* Lindl. respectively (see Discussion for notes on *Macdonaldia*). Mueller (1865: pp 97–98) described *T. porphyrosticta* F.Muell. and commented that his new species was similar to *T. variegata* and *T. spiralis* thereby effectively creating these two new combinations. Benthams (1873) recognised only *T. variegata* while reducing *T. spiralis* and *T. porphyrosticta* to synonymy. Mueller (1882) followed Benthams classification. Cheeseman (1911) described *T. matthewsii* Cheesem. from plants found on the North Island of New Zealand and later Rogers (1930), apparently unaware of Cheesemans species, described *T. daltonii* R.S.Rogers (as *T. D'Altonii*) from Halls Gap in the Grampians, Victoria. Nicholls (1949) created four varieties of *T. spiralis*—*T. spiralis* var. *scoulerae* Nicholls, *T. spiralis* var. *pallida* Nicholls, *T. spiralis* var. *punctata* Nicholls and *T. spiralis* var. *pulchella* Nicholls—all of which, as well as the type variety, are well illustrated in colour in Nicholls (1951). George (1971) recognised all of Nicholls' varieties except var. *pulchella*, which he relegated to synonymy under the type variety. He also relegated *T. porphyrosticta* to synonymy under *T. variegata* and recognised *T. matthewsii* as occurring in Western Australia. George (1984) described *T. variegata* var. *apiculata* A.S.George from plants collected between Eneabba and Mogumber north of Perth. Jones (1988) followed George (1971), but in a brief entry in the supplement at the back of the book *T. variegata* var. *apiculata* was raised informally to species rank as *T. apiculata* (A.S.George) M.A.Clem. & D.L.Jones. Following Clements' study of the various type specimens, Clements and Jones in Clements (1989) formally raised *T. variegata* var. *apiculata* to species rank as *T. apiculata*. Otherwise Clements (1989) recognised only *T. matthewsii*, *T. spiralis* var. *spiralis*, *T. spiralis* var. *pulchella* and *T. variegata* as distinct taxa. Hoffman and Brown (1992) recognised only *T. apiculata*, *T. spiralis* and *T. variegata* as occurring in Western Australia, although they do allude to *T. spiralis* var. *pulchella* and the taxon from Western Australia that was equated by George (1971) with *T. matthewsii* as possibly being distinct entities worthy of recognition.

Hoffman and Brown (1998) followed their earlier work but also recognised two informal taxa, both as *T. aff. variegata*, one from north of Perth, the other from the south coast of Western Australia. Brown *et al.* (2008) recognised and illustrated the seven Western Australian species described in this paper, either by their currently accepted names or the manuscript names ascribed by the current author.

Discussion

Historically there has been significant confusion about the correct application of names and the interpretation of species within the *Thelymitra variegata* complex. At least some of this confusion has persisted to the present day and has revealed itself in the many floras and orchid books published over the years.

Lindley (1839–40) described the first two species in the group as *Macdonaldia variegata* and *M. spiralis* respectively and distinguished these, and several other apparently unrelated species, from *Thelymitra* in having "the anther incumbent, and not parallel with the stigma". The generic name *Macdonaldia* Gunn ex Lindl. was coined by the notable plant collector Ronald Gunn in honour of Mrs Smith née Macdonald an orchid collector from Tasmania. Hooker (1858) reduced *Macdonaldia* to a section within *Thelymitra* differing from his other sections in having the "Column bifid at the apex, its sides not produced into toothed or feathery arms. Anther projecting, generally more or less granular or villous". Mueller (1865, p. 98) did not recognise *Macdonaldia* and created the new combinations *T. variegata* and *T. spiralis*. In the same article, Mueller (1865) described *T. porphyrosticta* from specimens collected by Maxwell near Salt River and Kalgan in Western Australia. Following my examination of the two type specimens at MEL, I have concluded that one (Kalgan River) is referable to *T. variegata* (lectotypified below) the other (Salt River) to *T. spiralis* (rejected syntype). A specimen at Kew (not seen by me) collected by Maxwell at Kalgan River is an isolectotype (George 1971). Benthams (1873) recognised only *T. variegata* while relegating *T. spiralis* (and *T. porphyrosticta*) to synonymy therein. Benthams (1873) recognised *Macdonaldia* as a section within *Thelymitra* and defined it as "Column-wing broadly produced behind the anther, but much shorter than it, and not

Table 1. Taxonomic history of the *T. variegata* complex showing the names in *Macdonaldia* and *Thelymitra* used by various authors for the eight taxa recognised in the current treatment

Author	Name used							
Lindley (1839–1840)	<i>M. variegata</i>	<i>M. spiralis</i>	n/a	n/a	n/a	n/a	n/a	n/a
Lindley (1840)	<i>M. variegata</i>	<i>M. spiralis</i>	n/a	n/a	n/a	n/a	n/a	n/a
Mueller (1865)	<i>T. variegata</i> <i>T. porphyrosticta</i>	<i>T. spiralis</i> <i>T. porphyrosticta</i>	n/a	n/a	n/a	n/a	n/a	n/a
Bentham (1873)	<i>T. variegata</i>	<i>T. variegata</i>	n/a	n/a	n/a	n/a	n/a	n/a
Mueller (1882)	<i>T. variegata</i>	<i>T. variegata</i>	n/a	n/a	n/a	n/a	n/a	n/a
Cheeseman (1911)	<i>T. variegata</i>	nane	<i>T. matthewsii</i>	n/a	n/a	n/a	n/a	n/a
Rogers (1930)	<i>T. variegata</i>	<i>T. spiralis</i>	<i>T. D'Altanii</i>	n/a	n/a	n/a	n/a	n/a
Nicholls (1949), Nicholls (1951) & Nicholls (1969)	<i>T. variegata</i>	* <i>T. spiralis</i> var. <i>spiralis</i> <i>T. spiralis</i> var. <i>scaulerae</i> <i>T. spiralis</i> var. <i>pallida</i> <i>T. spiralis</i> var. <i>punctata</i>	<i>T. matthewsii</i>	<i>T. spiralis</i> var. <i>pulchella</i>	n/a	n/a	n/a	n/a
George (1971)	<i>T. variegata</i>	<i>T. spiralis</i> var. <i>spiralis</i> <i>T. spiralis</i> var. <i>scaulerae</i> <i>T. spiralis</i> var. <i>pallida</i> <i>T. spiralis</i> var. <i>punctata</i> <i>T. spiralis</i> var. <i>pulchella</i>	<i>T. matthewsii</i>	<i>T. spiralis</i> var. <i>spiralis</i>	n/a	<i>T. matthewsii</i>	n/a	n/a
Hoffman & Brown (1984)	<i>T. variegata</i>	<i>T. spiralis</i>	nane	none	<i>T. sp</i>	<i>T. matthewsii</i>	n/a	n/a
George (1984)	<i>T. variegata</i> var. <i>variegata</i>	nane	nane	none	<i>T. variegata</i> var. <i>apiculata</i>	nane	n/a	n/a
Jones (1988)	<i>T. variegata</i>	* <i>T. spiralis</i> var. <i>spiralis</i> <i>T. spiralis</i> var. <i>scaulerae</i> <i>T. spiralis</i> var. <i>pallida</i> <i>T. spiralis</i> var. <i>punctata</i>	<i>T. matthewsii</i>	none	<i>T. variegata</i> var. <i>apiculata</i> <i>T. apiculata</i>	<i>T. matthewsii</i>	n/a	n/a
Clements (1989)	<i>T. variegata</i>	<i>T. spiralis</i> var. <i>spiralis</i> <i>T. spiralis</i> var. <i>scaulerae</i> <i>T. spiralis</i> var. <i>pallida</i> <i>T. spiralis</i> var. <i>punctata</i>	<i>T. matthewsii</i>	<i>T. spiralis</i> var. <i>pulchella</i>	<i>T. apiculata</i>	<i>T. matthewsii</i>	n/a	n/a
Hoffman & Brown (1992)	<i>T. variegata</i>	<i>T. spiralis</i> ? <i>T. matthewsii</i>	nane	* <i>T. spiralis</i> var. <i>pulchella</i>	<i>T. apiculata</i>	? <i>T. matthewsii</i>	n/a	n/a
Hoffman & Brown (1998)	<i>T. variegata</i>	<i>T. spiralis</i> ? <i>T. matthewsii</i>	nane	* <i>T. spiralis</i> var. <i>pulchella</i>	<i>T. apiculata</i>	? <i>T. matthewsii</i>	<i>T. aff. variegata</i>	<i>T. aff. variegata</i>
Brown et al. (2008)	<i>T. variegata</i>	<i>T. spiralis</i>	nane	<i>T. maculata</i> ms	<i>T. apiculata</i>	<i>T. uliginosa</i> ms	<i>T. speciosa</i> ms	<i>T. pulcherrima</i> ms
Jeanes (this paper)	<i>T. variegata</i>	<i>T. spiralis</i>	<i>T. matthewsii</i>	<i>T. maculata</i>	<i>T. apiculata</i>	<i>T. uliginosa</i>	<i>T. speciosa</i>	<i>T. pulcherrima</i>

*Not mentioned specifically by this name, but the identity of the taxon is implicit in the context.

hood-shaped. Slender flexuose herbs, with the habit of *T. antennifera*". *Thelymitra carnea* R.Br. and *T. flexuosa* Endl. were the only species Bentham included within this section, while he placed *T. variegata* in his section *Biaurella* along with four apparently unrelated species. Few authors since Bentham have given *Macdonaldia* any formal recognition.

The description of *T. matthewsii* (Cheeseman 1911) brought the number of generally recognised species within the group to three. Apparently Cheeseman believed his new species to be endemic to New Zealand as there is no mention in his article about it occurring in Australia. When Rogers (1930) described *T. daltonii* (as *T. D'Altonii*) from the Grampians in Victoria, he was either unaware of Cheeseman's article (he makes no mention of it in his protologue) or he believed *T. matthewsii* to be a New Zealand endemic and chose to ignore it. Whatever the case may be it soon became evident that the two names were synonymous, as indicated by Nicholls (1949, 1951; 1969). George (1971) alluded to the presence of *T. matthewsii* in Western Australia based on plants discovered to the east of Perth and illustrated later in Hoffman and Brown (1984). My study of these plants and others from several localities in the Albany area has shown them to be of an undescribed species distinct from *T. matthewsii* (see *T. uliginosa* Jeanes below).

Nicholls (1949) described and illustrated four new varieties of *T. spiralis* – var. *scoulerae*, var. *pallida*, var. *punctata* and var. *pulchella* – the first three based on plants collected by Mrs E. Scouler at Yarloop, the last from plants collected near Bolgart by Mrs R. Erickson, all from Western Australia. George (1971) and Clements (1989) differed in their interpretation of the holotype of *T. spiralis* hence their interpretation of Nicholls' varieties also differed. The former interpreted the type of *T. spiralis* as being the same taxon as Nicholls' var. *pulchella* and hence relegated that variety to synonymy, while maintaining Nicholls' other three varieties as distinct. Clements (1989) interpreted the type of *T. spiralis* as being distinct from Nicholls' var. *pulchella* but rather similar to the other three varieties of Nicholls, which he consequently did not recognise as distinct taxa. In this matter my interpretation of the types follows that of Clements. In fact Nicholls' var. *pulchella* is so distinctive (and different from

T. spiralis) that I believe it warrants recognition at species rank. The epithet 'pulchella' is, however, unavailable at species rank due to the presence of *T. pulchella* Hook. f. from New Zealand so a new name had to be coined (see *T. maculata* Jeanes below).

George (1984) described *T. variegata* var. *apiculata* from plants collected near Badgingarra homestead north of Perth. These differed from the type variety primarily in the presence of apiculate lateral lobes on the column and the less obviously spiralled leaf blade. The distinctiveness of this taxon was so significant that it was soon raised to species rank (Clements 1989) as *T. apiculata*.

Hoffman and Brown (1998) illustrated and informally described two apparently distinct taxa related closely to *T. variegata*, both as *T. aff. variegata*. My own research has shown these two allopatric taxa to be sufficiently distinct morphologically, ecologically and by flower colour to warrant recognition at species rank (see *T. speciosa* Jeanes and *T. pulcherrima* Jeanes below).

Szlachetko (1995) recognised *Macdonaldia* as a genus distinct from *Thelymitra* based on differences in the column structure. He recognised 13 species in *Macdonaldia*, and created nine new combinations (one of which, *M. venosa* (R.Br.) Szlach., was superfluous), but failed to list all the species belonging to that genus according to his concepts. Szlachetko and Rutkowski (2000) again recognised *Macdonaldia* as distinct from *Thelymitra*, but did not list the species belonging to either genus according to their concepts. It is clear from their generic key that some species, traditionally regarded as belonging to *Thelymitra*, have characteristics of both their *Macdonaldia* and *Thelymitra* and it would be difficult to place these species satisfactorily in either genus. The classification of Szlachetko and Rutkowski has not been taken up by later workers on the group including the current author. All the definitions of *Macdonaldia* by the various authors over the years, whether at generic or sub-generic level, have varied considerably. Significantly, the type species of *Macdonaldia* was designated by Clements (1989) as *M. smithiana* Gunn ex Lindl. (= *T. flexuosa*), a species not belonging to the *T. variegata* complex. Preliminary phylogenetic studies of *Thelymitra* based on ribosomal DNA confirm that *Macdonaldia* is paraphyletic and that all its elements are embedded within *Thelymitra*,

and that species in the *T. variegata* complex form a separate clade embedded deeply within the genus. (M. Clements pers. comm.)

Explanation of the terminology used

The genus *Thelymitra* is unusual in the Orchidaceae in that the six perianth segments generally differ very little from each other in terms of size, shape and ornamentation. The labellum does not bear any hairs, calli, glands, ridges, lobes, teeth or fringes and is apparently not involved in pollination. Since the perianth is virtually actinomorphic and generally lacks characters by which to distinguish the species, traditionally the structure of the column has supplied most of these distinguishing characters. Over the years a terminology has evolved to describe the column structure in *Thelymitra*, but some of these terms are poorly understood and some have never been defined adequately. Below is an explanation of some of the terms commonly used in this paper; most have a traditional usage, although this has often not been well understood.

Column (gynostemium): The column is exposed in the centre of the flower, it lacks a free filament and style, is short and thick and broadly winged from below the stigma to the level of the anther or beyond. The apex is usually 3–5-lobed and is often ornamented with trichomes, fringes, teeth, calli, glands, tubercles or lobes. In members of the *T. variegata* complex the apex of the column has a pair of prominent suborbicular to elliptic lateral lobes and a rudimentary post-anther lobe.

Post-anther lobe (mid-lobe): This structure lies beyond the point of insertion of the anther and of the lateral lobes, and it is usually of a different colour to the rest of the column. It has a complex vascular supply always associated with that of the functional anther and may be regarded as an outgrowth of the filament. In some species it is represented only by a short flap or a band of small glands crowded across the back of the anther. In most species it extends well beyond the anther with a free margin that may be plain, undulate, toothed, notched or variously ornamented with tubercles. At its maximum development it forms a fleshy, tubular hood that is variously open on the ventral side and overhangs and obscures the anther. In the *T. variegata* complex the post-anther lobe is rudimentary, extending only a short distance beyond

the point of insertion of the anther, with an arc of small ovoid to digitate glands on the dorsal surface.

Lateral lobes (column-arms or lateral staminodes): These two structures lie one on each side of the post-anther lobe and extend forward or upward and often converge. They are each supplied by a single unbranched vascular bundle and are thought to represent staminodes. They may be flat and ribbon-like, terete and finger-like, straight, curved, twisted spirally or bent sharply, and are usually ornamented with lobes, teeth, tubercles or trichomes. The lateral lobes are suborbicular to elliptic in members of the *T. variegata* complex, are more or less straight, parallel or divergent and point in the same general direction as the body of the column or slightly forward.

Auxiliary lobes (accessory lobes or side lobules): Several species of *Thelymitra* have a pair of distinct lobes between the post-anther lobe and the lateral lobes. These have no vascular strand and are most accurately described as being part of a tripartite post-anther lobe. They tend to be fleshy with irregularly jagged margins and sometimes have small surface tubercles. In the *T. variegata* complex the auxiliary lobes are completely absent.

Anther: In *Thelymitra*, the anther is usually small, ovoid, and situated entirely between the column wings. The connective extends beyond the pollinia into an apical beak-like projection of varying size. The anther may be entirely above the stigma or variously obscured behind it. In the *T. variegata* complex the anther is usually inserted near the apex of the column, the pollinia usually held mostly above the stigma. The anther beak is very well developed, usually being about as long as the pollinia, is fleshy and more or less straight or slightly curved forward when seen in profile.

Pollinia: Members of the genus *Thelymitra* possess four pollinia in two groups of two. In the *T. variegata* complex the pollinia are usually tightly bound with the pollinarium being removed by insects as a single unit. However, autogamy has been noted in *T. matthewsii* and is believed to occur in *T. uliginosa*.

Stigma: The stigma in *Thelymitra* is more or less bi-lobed at the apex, usually quadrate or transverse-elliptic in shape and located at the base of the column on a thick stalk.

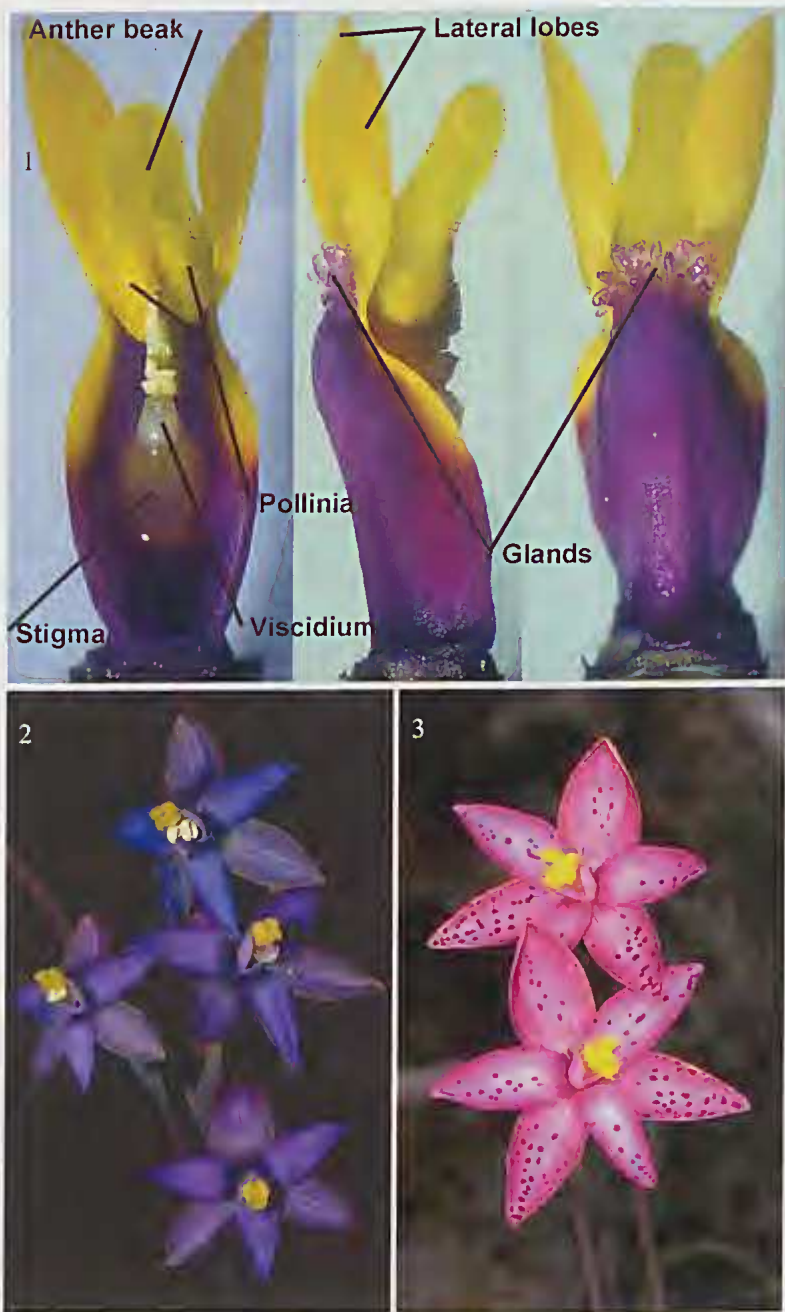


Figure 1-3. 1. Column features of *Thelymitra variegata*. From left to right: ventral, lateral and dorsal views (photographs by Jeff Jeanes); 2. *Thelymitra spiralis* (photograph by Ron Heberle); 3. *Thelymitra maculata* (photograph by Viv Holly).

Table 2. Various features of species in the *T. variegata* complex.

	<i>T. spiralis</i>	<i>T. maculata</i>	<i>T. uliginosa</i>	<i>T. matthewsii</i>	<i>T. apiculata</i>	<i>T. variegata</i>	<i>T. speciosa</i>	<i>T. pulcherrima</i>
Leaf base shape	ovate-auriculate	ovate	ovate-auriculate	ovate-auriculate	ovate	ovate-auriculate	ovate-auriculate	ovate-auriculate
Leaf blade orientation	spirally twisted	curved to slightly spiralled	spirally twisted	spirally twisted	curved	curved to slightly spiralled	spirally twisted	almost straight to slightly spiralled
Usual flower number	1-3	1	1 or 2	1	2-6	1-6	1	1-6
Sepal length (mm)	8-20(-26)	8-18(-25)	6-15	6-10(-13)	9-20	(10-)14-27	10-25	10-18
Sepal and petal colour and patterning	similar	dissimilar	similar	contrasting	similar	similar	similar	contrasting
Length of lateral lobes of column (mm)	1.5-2.8	1.8-2.8	1.5-2.5	1.5-2	3-4.5	3-5	3-5.5	4-5.5
Shape of lateral lobes of column	ovate to elliptic	suborbicular to elliptic	ovate to elliptic	ovate to elliptic	oblong to elliptic	oblong to elliptic	oblong to elliptic	oblong to elliptic
Length of glands on post-anther lobe of column (mm)	0.2-0.6	0.2-0.6	0.2-0.4	0-0.2	0.1-0.7	0.4-1	0.4-0.7	0.4-1
Length of anther beak (mm)	0.5-1.5	0.8-1.5	0.8-1.5	0.4-0.8	2-4	1.8-2.7	2-3	2-3
Probable pollination biology	entomophilous	entomophilous	facultatively autogamous	facultatively autogamous	entomophilous	entomophilous	entomophilous	entomophilous
Flowering time	Jul.-Oct.	Jul.-Sep.	Jul.-Oct.	Aug.-Oct.	Jun.-Jul.	Aug.-Oct.	Jul.-Sep.	Jun.-Aug.
Preferred substrates	moist sandy clay soils	dry granite or laterite sandy loams	moist sandy clay soils	well-drained sandy and clay loams	shallow sandy soil on laterite	deep sandy soils	heavy clay loams that are wet in winter	lateritic or rarely sandy soils

Key to the known members of the *T. variegata* complex.

- 1 Lateral lobes of column <3 mm long; anther connective produced into a beak to 1.5 mm long.....2
- 1: Lateral lobes of column 3–6 mm long; anther connective produced into a beak usually >1.5 mm long.....5
- 2 Perianth segments mostly to 12 mm long, rarely to 15 mm long, unspotted3
- 2: Perianth segments mostly >12 mm long, often spotted4
- 3 Flower solitary, very rarely 2, deep purplish, strongly striated; petals and sepals usually to 10 mm long, of contrasting colour; dry open forests; South Australia, Victoria and New Zealand4. *T. matthewsii*
- 3: Flowers 1 or 2, pink, mauve or pale purplish, not strongly striated; petals and sepals often more than 10 mm long, of similar colour; swamp margins; Western Australia.....3. *T. uliginosa*
- 4 Flower usually solitary, pink; sepals and sometimes also the petals, heavily spotted and blotched dark pink or purplish in longitudinal lines; leaf-base not strongly auriculate, lamina often curved but not tightly spiralled; lateral lobes often suborbicular, orange or yellow; dry inland habitats.....2. *T. maculata*
- 4: Flowers 1–3, colour not as above; leaf-base strongly auriculate, lamina usually tightly spiralled; lateral lobes usually elliptic, yellow; more mesic near-coastal habitats.....1. *T. spiralis*
- 5 Lateral lobes of column with a terminal needle-like point; leaf-base not strongly auriculate, lamina curved, not tightly spiralled5. *T. apiculata*
- 5: Lateral lobes of column lacking a terminal needle-like point; leaf-base strongly auriculate, lamina tightly spiralled or not.....6
- 6 Flower usually solitary, rarely 2; perianth segments predominantly purplish, with broad, deep reddish gold edges and yellowish margins; found in heavy clay-loam soils.....7. *T. speciosa*
- 6: Flowers 1–6; perianth segments not coloured as above; found in lateritic soil or deep sand7
- 7 Perianth segments mostly to 18 mm long, of contrasting colour; sepals predominantly reddish brown with yellow margins; petals predominantly purplish; found in lateritic soil; flowers June to early August8. *T. pulcherrima*
- 7: Perianth segments mostly >18 mm long, more or less of similar colour, predominantly reddish, purplish or violet, variegated, mostly with darker spots or blotches, often with yellow margins; found in deep sand; flowers August to early October6. *T. variegata*

Materials and methods

This paper is the result of a qualitative and quantitative study of the pertinent type material (or photographic reproductions thereof), hundreds of herbarium specimens (both dry and spirit-preserved) from AD, BM, BRI, CANB, E, HO, MEL, NSW, P, PERTH, QRS, SUNIV and WELT, and numerous freshly collected specimens, all of which were vouchered and deposited at the relevant herbaria. Orchid taxa in general, and *Thelymitra* taxa in particular, are much more readily identified from fresh living material where characters of the perianth, the column, flower colour and fragrance are still intact. Familiarity with the taxa gained from field study and the study of freshly collected specimens sent to me by field operatives has made the identification of dried

and spirit-preserved herbarium material (including type specimens) much easier.

When collecting *Thelymitra* for study it is essential that the entire above ground parts of the plant be taken, with the majority of the material being preserved in spirit. Plants preserved in the pressed state are often difficult to identify to species level in the absence of additional information. Spirit-preserved specimens, on the other hand, are generally much more easily identified to species level. The observation of plants growing *in-situ* is the ideal method of study for *Thelymitra* in general, and often it is only by this method that cryptic new species can be identified. For this reason the importance of field work in the study of species complexes within *Thelymitra* cannot be overstated and should form an integral part of

any future studies of the group. It is possible that other taxa worthy of recognition exist within this complex, but adequate information and collections of these are lacking at present.

Taxonomy

1. *Thelymitra spiralis* (Lindl.) F.Muell., *Fragm.* 5: 98 (1865)

Macdonaldia spiralis Lindl., *Edwards's Bot. Reg.* appendix to vols 1–23 [*Sketch Veg. Swan R.*]: 50 (1839–40). **Type:** Swan River, 1839, J. Drummond s.n. (holotype K-LINDL!, isotype BM!).

Thelymitra porphyrosticta F.Muell., *Fragm.* 5: 97–8 (1865) p.p. not as to type (see under *T. variegata*).

Thelymitra spiralis (Lindl.) F.Muell. var. *pallida* Nicholls, *Victorian Naturalist* 66: 55 (1949). **Type:** Yarloop, c. 1946, E. Scouler s.n. (holotype MEL!).

Thelymitra spiralis (Lindl.) F.Muell. var. *punctata* Nicholls, *Victorian Naturalist* 66: 55 (1949). **Type:** Yarloop, c. 1946, E. Scouler s.n. (holotype MEL, not found).

Thelymitra spiralis (Lindl.) F.Muell. var. *scoulerae* Nicholls, *Victorian Naturalist* 66: 55 (1949). **Type:** Yarloop, ix.–x.1946, E. Scouler s.n. (holotype MEL!).

Illustrations: Fitzgerald (1891) 2: 4 (as *T. variegata*); Nicholls (1951) plate 45, all except figs c & g; Nicholls (1969) plate 47, all except figs c & g; Jones (1988) page 304; Hoffman and Brown (1984) page 42; Hoffman and Brown (1992) page 253; Hoffman and Brown (1998) page 253; Heberle (2000) page 288; Jones (2006) page 254; Brown *et al.* (2008) page 321.

Virtually glabrous terrestrial herb. **Tubers** ovoid, 1–3 cm long, 4–10 mm wide, fleshy. **Leaf** ovate-auriculate at base, narrowing abruptly and linear above, 5–10 cm long, 4–10 mm wide, usually spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins often lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. **Inflorescence** 12–30(–45) cm tall, more or less straight. **Scape** 0.6–2 mm diam., wiry, green or purplish. **Sterile bract** solitary, lanceolate to ovate, 15–55 mm long, 3–9 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. **Fertile bracts** ovate to obovate, 6–22 mm long, 3–7 mm wide, green or purplish, sheathing the pedicels, margins connate at base, apex

acute to acuminate. **Pedicels** 7–22 mm long, slender. **Ovary** narrow-obovoid, 5–15 mm long, 1.5–4 mm wide. **Flowers** 1–2(–3), 21–40(–50) mm diameter, pink, reddish, purplish or blue, sometimes with darker spots or longitudinal veins, opening freely in warm weather. **Perianth segments** 8–20(–26) mm long, 2–10 mm wide, concave to almost flat, stiffly spreading, often shortly apiculate; **dorsal sepal** ovate to ovate-lanceolate, acute to subacute, usually broader than other segments; **lateral sepals** ovate-lanceolate to lanceolate, slightly asymmetric, acute to acuminate; **petals** ovate-lanceolate to lanceolate, slightly asymmetric, acute to acuminate; **labellum** lanceolate to linear-lanceolate, acute to acuminate, smaller than other segments. **Column** erect from the end of ovary, 4.5–7 mm long, 2.5–3.5 mm wide, broadly winged, similarly coloured to perianth; **post-anther lobe** vestigial, apical margin covered with an arc of digitate to globose glands 0.2–0.6 mm long; **auxiliary lobes** absent; **lateral lobes** more or less parallel, ovate or elliptic, 1.5–2.8 mm long, 0.8–1.6 mm wide, erect or obliquely erect, stipitate, fleshy, rugulose, yellow. **Anther** inserted at apex of column, obloid, 2.4–3.7 mm long, 1.5–2.5 mm wide, projecting forward at about 90° to column, yellow, the connective produced into a fleshy beak 0.5–1.5 mm long, dorsal surface pubescent, ventral surface channelled; **pollinarium** 1.5–2.5 mm long; **viscidium** elliptic, c. 0.7 mm long, c. 0.5 mm wide; **pollinia** coherent, cream. **Stigma** situated c. midway along column, orbicular to transversely broad-elliptic, c. 2.5 mm long, c. 2.5 mm wide, concave, margins irregular. **Capsules** obovoid, 10–20 mm long, 4–8 mm wide, erect, ribbed. (Fig. 2, Fig. 10 a–c)

Selected specimens examined: WESTERN AUSTRALIA: Kelmscott, 15.ix.1924, G. Coghill s.n. (MEL 2016031); Armadale, 22.ix.1946, W.H. Nicholls s.n. (MEL 643870); Two People Bay–Nanarup, 14.viii.1963, R. Oliver s.n. (PERTH 276723); 6 miles N of Porongurups, on Stirling Rd, 14.viii.1958, A.S. George s.n. (PERTH 277185); NW slopes of Mt Manypeaks, 11.viii.1986, G.J. Keighery 9660 (PERTH 855162); Kenwick, 1919, A.H. Mann s.n. (PERTH 306541); Cannington, 3.x.1900, A. Purdie s.n. (PERTH 276758); Swamp at Cannington, 14.ix.1920, G.N.Q. s.n. (PERTH 672343); Serpentine, 23.ix.1904, A. Purdie s.n. (PERTH 294985); North Dwellingup, peaty flats W of Railway Station, x.1932, B.T. Goadby s.n. (PERTH 276790); Albany, 8.viii.1963, R. Oliver s.n. (PERTH 276774); West Walpole, opposite Jarrah Road, 21.x.1993, D.L. Jones 12459 (CANB 9710428); E of Alexandra

Bridge, over Blackwood River, on Brockman Highway, 21.x.1975, D.F. Blaxell W75/206 & A.S. George (NSW 462466).

Distribution and habitat: Endemic to southwestern Western Australia, from just north of Perth to Israelite Bay, generally within about 100 km of the coast, with isolated northern populations in the Geraldton to Kalbarri region. Grows mostly in and around seasonal swamps in moist sandy clay soils. Altitude: 10–300 m.

Conservation status: Uncommon to rare, but extremely widespread and well conserved. Suggest 3RC by criteria of Briggs and Leigh (1996) and Near Threatened (NT) by criteria of IUCN (2001).

Flowering period: July to October, but mostly August and September.

Pollination biology: The large, freely opening flowers, functional viscidium, coherent pollen and sporadic production of seed capsules would indicate that this species is probably entomophilous.

Notes: *Thelymitra spiralis* is extremely variable, particularly in terms of flower size and colour and degree of spotting and veining of the perianth. It is most closely related to *T. maculata* but the latter usually has a single, generally smaller flower that is strongly spotted, particularly on the sepals, somewhat deflexed petals and lateral sepals, a narrower column often with suborbicular, orange lateral lobes, a less spirally twisted leaf that is barely auriculate at the base and a preference for drier inland habitats. *Thelymitra spiralis* is also related to *T. matthewsii* and *T. uliginosa*, but the latter two species have generally smaller flowers that are non-spotted and are self-pollinated.

Four varieties of *T. spiralis* have been described (Nicholls 1949). The var. *pallida* only differs from typical plants in having pale flowers, the var. *punctata* in having highly spotted flowers and the var. *scoulerae* in having larger, brightly coloured flowers with broad, somewhat flaccid perianth segments. These three varieties were later reduced to synonymy (Clements 1989) as they show no great departure in floral morphology from typical plants and are not distinct ecologically. The var. *pulchella* is ecologically and morphologically distinct from *T. spiralis*, and hence was recognised by Clements (1989) as a variety of *T. spiralis* and is herein raised to species rank as *T. maculata* (see below).

2. *Thelymitra maculata* Jeanes nom. et stat. nov.

Basionym: *Thelymitra spiralis* (Lindl.) F. Muell. var. *pulchella* Nicholls, Vict. Naturalist 66: 56 (1949). **Type:** Open plains or sand covered gravel, near Bolgart, 18.viii.1934, R. Erickson s.n. (lectotype QRS 044565! *hic designatus*). **Syntype:** Open plains or sand covered gravel, near Bolgart, viii.1949, R. Erickson s.n. (MEL not found).

Illustrations: Erickson (1951) plate 6: 20 (as *T. spiralis* var. *pulchella*); Nicholls (1951) plate 45, figs c & g (as *T. spiralis* var. *pulchella*); Nicholls (1969) plate 47, figs c & g (as *T. spiralis* var. *pulchella*); Heberle (2000) page 250 (as *T. spiralis*); Jones (2006) page 253; Brown et al. (2008) page 321.

Virtually glabrous terrestrial herb. **Tubers** obloid to ovoid, 1–1.5 cm long, 3.5–6 mm wide, fleshy. **Leaf** ovate at base, narrowing abruptly and linear to linear-lanceolate above, 5–8 cm long, 3–6 mm wide, curved or somewhat spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins sometimes shallowly lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. **Inflorescence** 9–20 cm tall, more or less straight. **Scape** 0.5–1 mm diam., wiry, green or purplish. **Sterile bract** solitary, lanceolate to ovate, 15–30 mm long, 3–5 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. **Fertile bract** ovate to obovate, 6–15 mm long, 3–5 mm wide, green or purplish, margins connate at base, sheathing the pedicels, apex acute to acuminate. **Pedicels** 5–16 mm long, slender. **Ovary** narrow-obovoid, 4–10 mm long, 1.5–3 mm wide. **Flower** usually solitary, 21–35(–45) mm diameter, pale to deep pink or purplish, sepals often darker than petals, usually with darker pink to purplish spots and blotches arranged in longitudinal lines on sepals and sometimes also on petals, opening freely in mild weather. **Perianth segments** 8–18(–25) mm long, 2–8 mm wide, concave to almost flat, petals and lateral sepals often somewhat deflexed; **dorsal sepal** ovate to ovate-lanceolate, acute to subacute, usually broader than other segments; **lateral sepals** ovate-lanceolate to lanceolate, slightly asymmetric, acute to subacute; **petals** ovate-lanceolate to lanceolate, slightly asymmetric, acute; **labellum** lanceolate to linear-lanceolate, acute to obtuse, smaller than other segments. **Column** erect from the end of ovary, 4.5–6.5 mm long,

2.5–3 mm wide, broadly winged, similarly coloured to perianth; *post-anther lobe* vestigial, apical margin covered with an arc of digitate to globose glands 0.2–0.6 mm long; *auxiliary lobes* absent; *lateral lobes* more or less parallel, elliptic to suborbicular, 1.8–2.8 mm long, 0.9–1.3 mm wide, curved, erect or obliquely erect, stipitate, fleshy, rugulose, orange or yellow. *Anther* inserted at apex of column, obloid, 2.5–3.5 mm long, 1.5–2 mm wide, projecting forward at about 90° to column, orange or yellow, the connective produced into a fleshy beak 0.8–1.5 mm long, dorsal surface pubescent, ventral surface channelled; *pollinarium* 1.5–2 mm long; *viscidium* elliptic, c. 0.7 mm long, c. 0.5 mm wide; *pollinia* coherent, cream. *Stigma* situated c. midway along column, orbicular or transversely broad-elliptic, c. 2 mm long, c. 2 mm wide, concave, margins irregular. *Capsules* not seen. (Fig. 3, Fig. 10 d–f)

Selected specimens examined. WESTERN AUSTRALIA: Mokine Nature Reserve, 1.viii.1985, G.J. Keighery & J.J. Alford 171 (PERTH 792187); Wongan Hills, ix.1967, J. Tonkinson s.n. (PERTH 277207); 25 miles S of Tammin (Tammin National Park), 2.viii.1968, R.D. Royce 8469 (PERTH 277231); Wongan Hills, 1.viii.1979, D. Kruske s.n. (PERTH 306924); Bolgart, 8.viii.1951, R. Erickson s.n. (PERTH 924962); 24.6 km E along York Road from Great Eastern Hwy, 100 m E from track to Mt Observation, 28.viii.1985, R. Peakall 6 (PERTH 561363); 11 miles SE of Ongerup, 26.viii.1973, K. Newbey 3732 (PERTH 276707); Watheroo, viii.1903, C. Andrews s.n. (PERTH 277657); Wongan Hills, 5.ix.1924, Came & Gardner s.n. (PERTH 277649); Wongan Hills, near Reserve Station, 11.ix.1973, P. Mann s.n. (PERTH 283908); Dragon Rocks Nature Reserve No. 36128, Dragon Rocks, 20.ix.1991, A.M. Coates 2841 (PERTH 5152968) York-Quellington Road, 26.xiii.1906, ?O.H. Sargent s.n. (PERTH 277665); Bouncer Road, Flynn State Forest, York, 28.viii.2007, F. & J. Hort 3007 (MEL 2296501, PERTH 05441536).

Distribution and habitat: Endemic to south-western Western Australia, between Watheroo, Ongerup and Hyden, growing in dry inland areas through the wheatbelt. Grows in heathland or Wandoo woodland, often near rock outcrops, on dry granitic or lateritic sandy loam soils. Altitude: 150–450 m.

Conservation status: Apparently quite rare, but very widespread and conserved. Suggest 3RC by criteria of Briggs and Leigh (1996) and Near Threatened (NT) by criteria of IUCN (2001).

Flowering period: July to September.

Pollination biology: The freely opening flowers, functional viscidium, coherent pollen and sporadic

production of seed capsules would indicate that this species is most likely entomophilous.

Notes: *Thelymitra maculata* is closely related to *T. spiralis* but the former usually has a single, generally smaller flower that is strongly spotted, particularly on the sepals, somewhat deflexed petals and lateral sepals, a narrower column often with suborbicular, orange lateral lobes, a less spirally twisted leaf that is barely auriculate at the base and a preference for drier inland habitats. *Thelymitra matthewsii* from eastern Australia and New Zealand and *T. uliginosa* grow in more mesic habitats, have a more spirally twisted leaf that is strongly auriculate at the base and smaller, darker coloured, unspotted flowers.

The raising of *T. spiralis* var. *pulchella* Nicholls to species rank requires the coining of a new epithet as 'pulchella' is already occupied at specific rank by the New Zealand endemic *T. pulchella*.

Etymology: Latin *macula*, spot; the sepals, and also sometimes the petals, of this species are strongly spotted.

3. *Thelymitra uliginosa* Jeanes sp. nov.

Thelymitra matthewsii Cheesem. affinis sed habitu plerumque elatiore, floribus plerumque binis majoribus pallidioribus et minus striatis, columna angustiore, lobis lateralibus minus manifeste stipitatis, habitatione humidior et occidentaliore differt.

Type: Western Australia. Mount Chance Track, Walpole-Nornalup National Park, 8.viii.1994, W. Jackson BJ 271 (holotype PERTH 04447379).

Thelymitra matthewsii auct. non Cheesem.: A.S. George (1971). *Nuytsia* 1(2): 194 p.p.; N. Hoffman & A. Brown (1984) *Orchids of South-West Australia* 34 p.p.

Illustrations: Hoffman and Brown (1984) page 34 (as *T. matthewsii*); Jones (2006) page 254; Brown *et al.* (2008) page 321.

Virtually glabrous terrestrial herb. *Tubers* not seen. *Leaf* ovate-auriculate at base, narrowing abruptly and linear above, 5–10 cm long, 4–8 mm wide, usually spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins often lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. *Inflorescence* 10–25(–35) cm tall, more or less straight. *Scape* 0.5–1.2 mm diam., wiry, green or purplish. *Sterile*

bract solitary, lanceolate to ovate, 15–40 mm long, 3–8 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. *Fertile bracts* ovate to obovate, 6–18 mm long, 3–7 mm wide, green or purplish, margins connate at base, sheathing the pedicels, apex acute to acuminate. *Pedicels* 4–20 mm long, slender. *Ovary* narrow-obovoid, 5–12 mm long, 1.5–4 mm wide. *Flowers* 1, or less often 2, 15–30 mm diameter, pink, mauve, blue or purplish with darker longitudinal veins inside, sepals greenish with pink to purplish veins outside, opening tardily in warm weather. *Perianth segments* 6–15 mm long, 2–7 mm wide, concave to almost flat, stiffly spreading, often shortly apiculate; *dorsal sepal* ovate to ovate-lanceolate, acute to subacute, usually broader than other segments; *lateral sepals* ovate-lanceolate to lanceolate, slightly asymmetric, acute to acuminate; *petals* ovate-lanceolate to lanceolate, slightly asymmetric, acute to acuminate; *labellum* lanceolate to linear-lanceolate, acute, smaller than other segments. *Column* erect from the end of ovary, 3.5–5.5 mm long, 2.5–3 mm wide, broadly winged, similarly coloured to perianth; *post-anther lobe* vestigial, apical margin covered with an arc of digitate to globose glands 0.2–0.4 mm long; *auxiliary lobes* absent; *lateral lobes* more or less parallel, ovate or elliptic, 1.5–2.5 mm long, 0.8–1.4 mm wide, erect or obliquely erect, stipitate, fleshy, rugulose, yellow. *Anther* inserted at apex of column, obloid, 2.5–3.2 mm long, 1.5–2 mm wide, projecting forward at about 90° to column, yellow, the connective produced into a fleshy beak 0.8–1.5 mm long, dorsal surface pubescent, ventral surface channelled; *pollinarium* 1.5–2.5 mm long; *viscidium* elliptic, c. 0.6 mm long, c. 0.5 mm wide; *pollinia* friable, mealy, cream. *Stigma* situated c. midway along column, orbicular to transversely broad-elliptic, c. 2 mm long, c. 2 mm wide, concave, margins irregular. *Capsules* obovoid, 7–15 mm long, 4–8 mm wide, erect, ribbed. (Fig. 4, Fig. 10 g–i)

Selected specimens examined: WESTERN AUSTRALIA: Lochyer, Albany, 10.viii.1979, *R. Heberles.n.* (PERTH 276715); Just W of Walpole, SW Highway, 25.viii.1978, *T. Wilson s.n.* (PERTH 277169); Denmark Shire, Little Lindesay, 0.5 km along track to N from main walk track, 30.viii.1996, *B.G. Hammersely* 1613 (PERTH 4627288); Mount Lindesay, 22.viii.1995, *S. Barrett* 574 (PERTH 4136705); Boronia Reserve, near Goodchild's property, c. 14 miles direct NNW of Albany, 14.ix.1965, *A.C. Beauglehole* 12855 (PERTH 4258037); Mt Chance track, NW of Walpole,

18.viii.1995, *C. French* DLJ14258 (CANB 611730); Darling district: Rock verge, 1.4 km N of Inlet R, Hwy 1, 16.viii.1995, *C. French* DLJ14257 (CANB 611729); Darling district: William Bay National Park, ranger's house, 21.x.1994, *W. Jackson* DLJ13653 (CANB 611731); Stirling Range Drive, 3.2 km W of Chester Pass Road, 100 m W of old access track to Mt Hassell Picnic area, 16.x.1999, *C.J. French* 2093 (CANB 611754); George St Reserve, Albany, 6.vii.1987, *R. Heberle* 12 (AD RH12); Brookton Highway, 42–43 mile pegs, 10.ix.1960, *A.S. George* 1514 (PERTH 276693).

Distribution and habitat: Endemic to south-west Western Australia, mostly between Bremer Bay and Augusta, with a disjunct collection from the Darling Ranges east of Perth. Grows in open forest amongst sedges and rushes in and around seasonal swamps in moist sandy clay soils. Altitude: 10–400 m.

Conservation status: Uncommon to rare, but widespread and conserved. Suggest 3RC by criteria of Briggs and Leigh (1996) and Near Threatened (NT) by criteria of IUCN (2001).

Flowering period: July to October.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra uliginosa* is most closely related to the eastern Australian and New Zealand species *T. matthewsii*, but the latter grows in drier habitats, is generally shorter, has a single (very rarely two) slightly smaller, darker, more prominently striated flower and a broader column with more obviously stipitate lateral lobes. *Thelymitra uliginosa* is also related to *T. spiralis* and *T. maculata* but those species have generally larger, insect-pollinated flowers that are often spotted or blotched.

Etymology: Latin *uliginosa*, moist, wet; this species prefers to grow in seasonally wet substrates.

4. *Thelymitra matthewsii* Cheesem., *Trans. & Proc. New Zealand Inst.* 43: 177 (1911)

Macdonaldia matthewsii (Cheesem.) Szlach. *Fragm. Fl. Geobot.*, Suppl. 3: 113 (1995). **Type:** New Zealand: Mongonui Country, low hills between Lake Tongongoe and the coast, *R.H. Matthews s.n.* (holotype K).

Thelymitra daltonii R.S. Rogers, *Trans. & Proc. Roy. Soc. South Australia* 54: 42–4 (1930). (as *T. D'Altonii*) **Type:** Halls Gap, Grampians, 26.ix.1929, *A.B. Braine & M. Braine s.n.* (lectotype AD!). **Syntype:** Victoria, Halls Gap, Grampians, 8.x.1922, *C.W. D'Alton s.n.* (AD!).

Illustrations: Nicholls (1951) plate 47; Nicholls (1969) plate 46; Gray (1971) page 39; Bates and Weber (1990)

plates 214 & 215; Weber and Entwisle (1994) page 850; Backhouse and Jeanes (1995) page 348; St George (1999) page 147; Jeanes and Backhouse (2004) page 96; Jeanes and Backhouse (2006) page 195; Jones (2006) page 253.

Virtually glabrous terrestrial herb. *Tubers* ovoid, 1–2 cm long, 5–10 mm wide, fleshy. *Leaf* ovate-auriculate at base, narrowing abruptly and linear above, 3–7 cm long, 3–7 mm wide, spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. *Inflorescence* 9–15 cm tall, more or less straight. *Scape* 0.7–1 mm diam., wiry, green or purplish. *Sterile bract* solitary, lanceolate to ovate, 10–30 mm long, 3–7 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. *Fertile bract* ovate to obovate, 5–12 mm long, 2–6 mm wide, green or purplish, margins connate at base, sheathing the pedicels, apex obtuse to acute. *Pedicels* 2–12 mm long, slender. *Ovary* narrow-obovoid, 4–10 mm long, 2–4 mm wide. *Flower* 1, very rarely 2, 15–20(–27) mm diameter, purplish with darker longitudinal stripes, sepals usually more reddish than petals and labellum, opening freely in warm weather. *Perianth segments* 6–10(–13) mm long, 2–6(–8) mm wide, concave, stiffly spreading; *dorsal sepal* ovate to obovate, subacute, larger than other segments; *lateral sepals* lanceolate to narrow-ovate, acute; *petals* lanceolate to narrow-ovate, acute; *labellum* lanceolate to narrow-ovate, acute, smaller than other segments. *Column* erect from the end of ovary, 4–5.5 mm long, 2.5–4 mm wide, broadly winged, purplish; *post-anther lobe* vestigial, apical margin irregular, covered with an arc of globose glands c. 0.2 mm long; *auxiliary lobes* absent; *lateral lobes* more or less parallel, ovate to elliptic, 1.5–2 mm long, 0.7–1.3 mm wide, obliquely erect or bent forwards, plano-convex, sometimes twisted, shortly stipitate, fleshy, smooth or minutely tuberculate, yellow. *Anther* inserted at apex of column, obloid, 2–3 mm long, 1.5–2 mm wide, projecting forward at about 90° to column, extending beyond lateral lobes, yellow, the connective produced into a fleshy beak 0.4–0.8 mm long, dorsal surface minutely tuberculate, ventral side channelled; *pollinarium* 1.5–2.5 mm long; *viscidium* circular, c. 0.5 mm diam.; *pollinia* friable, mealy, white.

Stigma situated c. midway along column, orbicular or transversely broad-elliptic, 1.5–2.5 mm long, 2–2.5 mm wide, concave, margins irregular. *Capsules* obovoid, 10–18 mm long, 4–7 mm wide, erect, ribbed. (Fig. 5, Fig. 11 a–c)

Selected specimens examined: **SOUTH AUSTRALIA:** Didicoolum Rd, SE, 9.ix.1964, D. Hunt 2120 (AD 98620057 & AD 96527066); South Lofty District: Kuitpo, ix.1981, R.J. Bates 2088 (AD 98207132); Upper South-east District: c. 17 km SE of Meningie, 25.viii.1974, C.T. James, J. Davies & K. Thiele s.n. (AD 97436001); Upper South-east District: Messent Wildlife Reserve, 10.ix.1968, R.H. Kuchel 2760 (AD 97641516); Kangaroo Island District: Hundred of Gosse, 8.ix.1974, G. Jackson 1001 (AD 97521085). **VICTORIA:** East Gippsland, near Genoa, 20.ix.1986, A.B. Peisley s.n. (MEL 15S1480); Grampians, Mirranatwa Gap, 13.ix.1976, A.C. Beauglehole 55435 & C. & D. Woolcock (MEL 652734); Pomonal, 16.ix.1934, ?L. Banfield s.n. (MEL 573526); South Gippsland. Müllungdung forest; Massey's Rd 3 km N of Boundary Rd; 9 km. N. of Woodside, 30.ix.1979, K.W. Black s.n. (MEL 599316); Genoa, East Gippsland, ix.1940, N.A. Wakefield s.n. (MEL 114448); Grampians. On W side of Henham Tk approx. 200 m from Mirranatwa Gap Rd, 14.ix.1979, J. Eichler s.n. (MEL 1515748); East Gippsland. Genoa, ix.1939, N.A. Wakefield s.n. (MEL 1513162); Devil's Garden, the Grampians, x.1930, A.B. Braine s.n. (MEL 625491); Genoa, 23.ix.1988, A. Peisley DLJ2908 (CANB 8806571); Black Range, 27.ix.1987, R.J. Bates 10463 (AD 98741363). **NEW ZEALAND:** North Island: Kaitaia near Lake Tangonge, 1914, H.B. Matthews s.n. (AD 97435002); North Island: Kaitaia near Lake Tangonge, 13.ix.1914, H.B. Matthews s.n. (AD 97435001); North Island: Kaitaia, ix.1924, H.B. Matthews s.n. (NSW 181305); North Island. Aupouri Ecological Region and District, Kaitaia, ix.1911, H.B. Matthews s.n. (AK 25890); Near Kaitaia, H.B. Matthews s.n. (WELT 3767).

Distribution and habitat: South Australia, Victoria and New Zealand. Grows in open forest and heathy woodlands on well-drained sand and clay loam soils. Favours disturbed areas such as road sides, gravel pits, disused tracks and animal trails. Altitude: 20–300 m.

Conservation status: Widespread and conserved, but extremely rare and probably endangered. Suggest 3EC by criteria of Briggs and Leigh (1996) and Endangered (EN) by criteria of IUCN (2001).

Flowering period: August to early October.

Pollination biology: This species is facultatively autogamous.

Notes: *Thelymitra matthewsii* is most closely related to *T. uliginosa* from Western Australia, but the latter grows in swampy habitats, is often taller, has either one



Figure 4-9. 4. *Thelymitra uliginosa* (photograph by Andrew Brown, Department of Environment and Conservation, Western Australia); 5. *Thelymitra matthewsii* (photograph by Jeff Jeanes, Royal Botanic Gardens, Melbourne); 6. *Thelymitra apiculata* (photograph by Andrew Brown, Department of Environment and Conservation, Western Australia); 7. *Thelymitra variegata* (photograph by Ron Heberle); 8. *Thelymitra speciosa* (photograph by Andrew Brown, Department of Environment and Conservation, Western Australia); 9. *Thelymitra pulcherrima* (photograph by Andrew Brown, Department of Environment and Conservation, Western Australia).

or two flowers that are slightly larger and paler pink or purple in colour and has less obviously stipitate lateral lobes on the column. Also related to *T. matthewsii* are *T. spiralis* and *T. maculata*, but these are endemic to Western Australia and have generally larger insect pollinated flowers.

5. *Thelymitra apiculata* (A.S. George) M.A.Clem. & D.L.Jones, *Austral. Orchid Res.* 1: 137 (1989)

Thelymitra variegata (Lindl.) F.Muell. var. *apiculata* A.S.George, *Nuytsia* 5(1): 62, f. 3L (1984). *Macdonaldia apiculata* (A.S. George) Szlach. *Fragm. Fl. Geobot.*, Suppl. 3: 112 (1995). **Type:** 7 miles (11 km) SE of Badgingarra homestead, Western Australia, 19.vi.1961, A.S. George 2598 (holotype PERTH!).

Illustrations: Hoffman and Brown (1984) page 40 (as *Thelymitra* sp.); Hoffman and Brown (1992) page 256; Hoffman and Brown (1998) page 256; Jones (2006) page 254; Brown *et al.* (2008) page 323.

Virtually glabrous terrestrial herb. *Tubers* not seen. *Leaf* linear to lanceolate, 5–13 cm long, 2.5–7 mm wide, erect, curved, canaliculate, fleshy, dark green with a purplish base, sheathing at base where pubescent, apex subacute. *Inflorescence* 15–35 cm tall, somewhat flexuose at nodes. *Scape* 0.8–1.8 mm diam., wiry, green or purplish. *Sterile bract* usually solitary, rarely 2, linear-lanceolate to lanceolate, 20–65 mm long, 2–6 mm wide, green or purplish, sheathing only at very base, apex diverging from scape, acute to acuminate. *Fertile bracts* ovate-lanceolate to obovate-lanceolate, 4.5–37 mm long, 2–6 mm wide, green or purplish, margins connate at base and sheathing the pedicels, apex diverging from scape, acute to acuminate. *Pedicels* 2–15 mm long, slender. *Ovary* narrow-obovoid, 3–10 mm long, 1–3 mm wide, curved. *Flowers* 2–6, 23–40 mm diameter, usually bright purple to pinkish purple, often with darker spots and golden yellow margins, glossy, opening freely in mild weather. *Perianth segments* 9–20 mm long, 1.5–7 mm wide, concave to almost flat, stiffly spreading; *dorsal sepal* ovate to ovate-lanceolate, acute, usually broader than other segments; *lateral sepals* lanceolate to linear-lanceolate, often asymmetric, acute to acuminate; *petals* lanceolate to linear-lanceolate, often asymmetric, acute to acuminate; *labellum* lanceolate to linear-lanceolate, acute to acuminate, smaller than other segments. *Column* erect from the end of ovary,

3.5–7 mm long, 2.5–3.5 mm wide, broadly winged, similarly coloured to perianth; *post-anther lobe* vestigial, apical margin covered with an arc of digitate glands 0.1–0.7 mm long; *auxiliary lobes* absent; *lateral lobes* oblong to elliptic, 3–4.5 mm long, 0.8–1.3 mm wide, erect or obliquely erect, stipitate, fleshy, rugulose, yellow or orange, each terminated by a fine needle-like point 0.6–1.1 mm long. *Anther* more or less terminal, obloid, 4–6 mm long, 1.5–2.5 mm wide, projecting forward at about 45° to column, yellow, the connective produced into a fleshy beak 2–4 mm long, surface papillose, ventral surface channelled; *pollinarium* 1.5–2.5 mm long; *viscidium* elliptic, c. 0.8 mm long, c. 0.5 mm wide; *pollinia* coherent, cream. *Stigma* situated midway along column, orbicular to broadly transverse-elliptic, c. 2.5 mm long, c. 2 mm wide, concave, margins irregular. *Capsules* not seen. (Fig. 6, Fig. 11 d–f)

Selected specimens examined: WESTERN AUSTRALIA: Stockyard Gully, Jurien Bay, vii.1963, W.H. Butler 14 (PERTH 27B149); Coomallo–Jurien road, 2–3 km W of Brand Highway, vii.1981, P. Nihulinsky s.n. (PERTH 294756); 2.6 km from Brand Highway up McNamara Rd, 5.vii.1979, R.J. Cranfield 1275 (PERTH 27B173); North Wongonderrah Rd at junction Wongonderrah Rd and Brand Hwy, 12.vi.1988, B.J. Keighery s.n. (PERTH 1709496); 5.6 km E of Brand Hwy along Mullering Road, 2.vii.1992, R. Cranfield & P. Spencer 8297 (PERTH 252B371); Just W of Brand Hwy on Coomallo–Jurien Road, vi.1980, P. Nihulinsky s.n. (PERTH 27B165); Mogumber Mission, vi.1965, M.C. George s.n. (PERTH 27B1B1); Mogumber West Road, 14.4 km E of Brand Hwy, 18.vi.1997, C.J. French DLJ13969 (CANB 609368); Mogumber West Road, E of Brand Hwy, 18.vi.1994, C.J. French DLJ13036 (CANB 95171B4); Mogumber West Road, E of Brand Hwy, 18.vii.1996, C.J. French ORG85 (CANB 9707753).

Distribution and habitat: Endemic to south-western Western Australia, between Mogumber and Eneabba. Grows on the tops of lateritic hills amongst dense low shrubs in pockets of shallow sandy soil. Altitude: 100–200 m.

Conservation status: Currently classified in Western Australia as a Priority 4–Rare taxon.

Flowering period: June to July.

Pollination biology: The large, freely opening flowers, functional viscidium, coherent pollen and very sporadic production of seed capsules would indicate that this species is probably entomophilous.

Notes: *Thelymitra apiculata* is closely related to

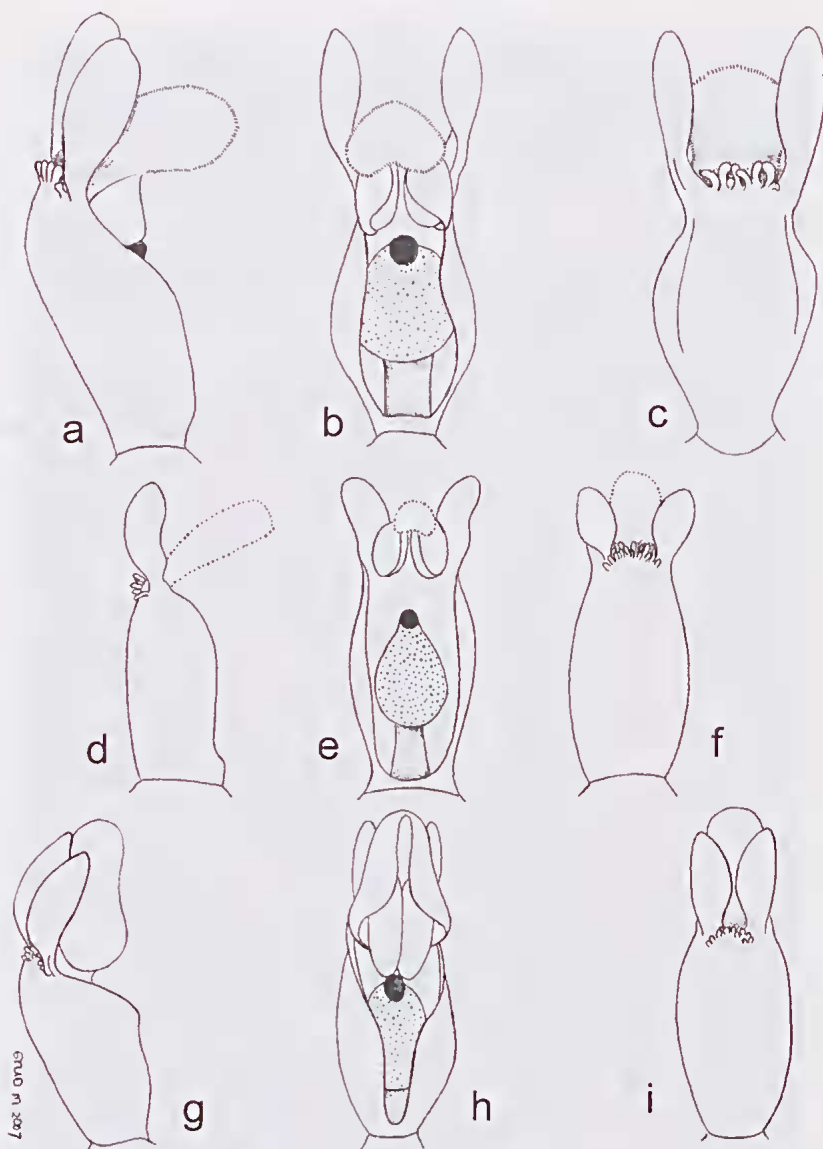


Figure 10. *Thelymitra spiolis*: **a** column from side $\times 8$; **b** column from front $\times 8$; **c** column from rear $\times 8$.
Thelymitra mocoloto: **d** column from side $\times 5$; **e** column from front $\times 5$; **f** column from rear $\times 5$.
Thelymitra uliginosa: **g** column from side $\times 8$; **h** column from front $\times 8$; **i** column from rear $\times 8$.

T. pulcherrima, *T. speciosa* and *T. variegata*, but the former species generally flowers earlier and has distinct needle-like points on the lateral lobes of the column.

6. *Thelymitra variegata* (Lindl.) F.Muell., *Fragm.* 5: 98 (1865)

Macdonaldia variegata Lindl. *Edwards's Bot. Reg.* appendix to vols 1–23 [*Sketch Veg. Swan R.*]: 50 (1839–

40). **Type:** Swan River, 1838, *J. Drummond s.n.* (holotype K-LINDL!, isotypes BM!, K).

Thelymitra porphyrosticta F.Muell., *Fragm.* 5: 97–8 (1865) *p.p.* Lectotype *hic designatus*: *Ad margines paludum prope flumen Salt River et in vallibus humidis prope Kalgan* [Margins of swamps near Salt River and moist valleys, near Kalgan], *Maxwell s.n.* Kalgan River, MEL 114390!; isolectotype K n.v.

Illustrations: Erickson (1951) plate 4, plate 6: 19;

Nicholls (1951) plate 46; Nicholls (1969) plate 48; Jones (1988) page 305; Hoffman and Brown (1984) pages '2, 12 & 38; Hoffman and Brown (1992) page 255; Hoffman and Brown (1998) page 255; Heberle (1999) pages 49, 73 (lower) & 75; Jones (2006) page 255; Brown *et al.* (2008) page 323.

Virtually glabrous, somewhat glaucous terrestrial herb. *Tubers* ovoid, 1–2 cm long, 4–8 mm wide, fleshy. *Leaf* ovate-auriculate at base, narrowing abruptly and linear to linear-lanceolate above, 5–15 cm long, 5–10 mm wide, erect, curved or spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins often lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. *Inflorescence* 15–35 cm tall, more or less straight. *Scape* 1–2 mm diam., wiry, green or purplish. *Sterile bract* solitary, rarely 2, lanceolate to ovate, 15–65 mm long, 4–9 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. *Fertile bracts* ovate to obovate, 5–27 mm long, 2.5–8 mm wide, green or purplish, margins connate at base, sheathing the pedicels, apex acute to acuminate. *Pedicels* 4–20 mm long, slender. *Ovary* narrow-obovoid, 5–13 mm long, 1.5–3 mm wide, curved. *Flowers* 1–6, 30–56 mm diameter, usually predominantly reddish, purplish or violet, variegated, mostly with darker spots or blotches, often with yellow margins, with an overall glossy iridescent sheen, opening freely in warm weather. *Perianth segments* (10–)14–27 mm long, 2.5–10 mm wide, concave to almost flat, stiffly spreading; *dorsal sepal* ovate to ovate-lanceolate, acute to subacute, usually broader than other segments; *lateral sepals* lanceolate to linear-lanceolate, slightly asymmetric, acute to acuminate; *petals* lanceolate to linear-lanceolate, slightly asymmetric, acute to acuminate; *labellum* lanceolate to linear-lanceolate, acute to acuminate, smaller than other segments. *Column* erect from the end of ovary, 5–7 mm long, 3–5 mm wide, broadly winged, similarly coloured to perianth; *post-anther lobe* vestigial, apical margin covered with an arc of digitate glands 0.4–1 mm long; *auxiliary lobes* absent; *lateral lobes* parallel or diverging slightly, oblong to elliptic, 3–5 mm long, 0.9–2 mm wide, straight to shallowly s-shaped, erect or obliquely erect, stipitate, fleshy, rugulose, yellow or orange. *Anther* inserted at apex of column, obloid,

4–6 mm long, 1.5–2.5 mm wide, projecting forward at about 45° to column, yellow or orange, the connective produced into a fleshy beak 1.8–2.7 mm long, dorsal surface papillate, ventral surface channelled, papillate; *pollinarium* 2–3.2 mm long; *viscidium* elliptic, c. 0.7 mm long, c. 0.5 mm wide; *pollinia* coherent, cream. *Stigma* situated c. midway along column, orbicular to transversely broad-elliptic, 2.5–3 mm long, 1.7–2.5 mm wide, concave, margins irregular. *Capsules* obovoid, 10–20 mm long, 5–8 mm wide, erect, ribbed. (Fig. 7, Fig. 11 g–i)

Selected specimens examined: WESTERN AUSTRALIA:

Albany, 6.ix.1935, ?E.O. s.n. (MEL 573915); Jandakot, viii.1957, R. Filsan 45 (MEL 606281); King George Sound, 12.viii.1884, Franklyn 67 (MEL 114392); Albany district, 14.viii.1963, R. Oliver s.n. (PERTH 302228); Capel, 14.ix.1951, R.D. Royce 3790 (PERTH 278661); Russell Road, Jandakot, 16.viii.1959, A.S. George 116 (PERTH 279188); Canning Bridge, 27.viii.1948, R.D. Royce 2618 (PERTH 279161); Perth, viii.1900, A. Purdie s.n. (PERTH 279129); Site 145, 2 km SSE of Mount Lindesay, off Nutcracker Road, 20.iii.1997, K.A. Redwaad 075 (PERTH 4795474); Applecross, ix.1901, C. Andrews s.n. (PERTH 279579); Wanneroo, ix.1919, W.B. Alexander s.n. (PERTH 278696); Albany, 28.x.1988, H. Richards DLJ2920 (CANB 8806583).

Distribution and habitat: Endemic to south-west Western Australia, between Perth and Albany, mostly within 100 km of the coast. Grows in open sandy clearings amongst grass tussocks or rushes in shrubby vegetation, mostly on well-drained deep sandy soils. Altitude: 10–300 m.

Conservation status: Uncommon to rare, but widespread and well conserved. Suggest 3RC by criteria of Briggs and Leigh (1996) and Near Threatened (NT) by criteria of IUCN (2001).

Flowering period: August to early October.

Pollination biology: The large, freely opening flowers, functional viscidium, coherent pollen and sporadic production of seed capsules would indicate that this species is probably entomophilous.

Notes: *Thelymitra variegata* is most closely related to *T. apiculata*, *T. pulcherrima* and *T. speciosa*. *Thelymitra apiculata* can be distinguished by the presence of apiculate lateral lobes on the column. *Thelymitra pulcherrima* has a more northerly distribution, often grows in lateritic soils and usually has smaller flowers, the perianth of which have a different colour combination. *Thelymitra speciosa* has a more easterly

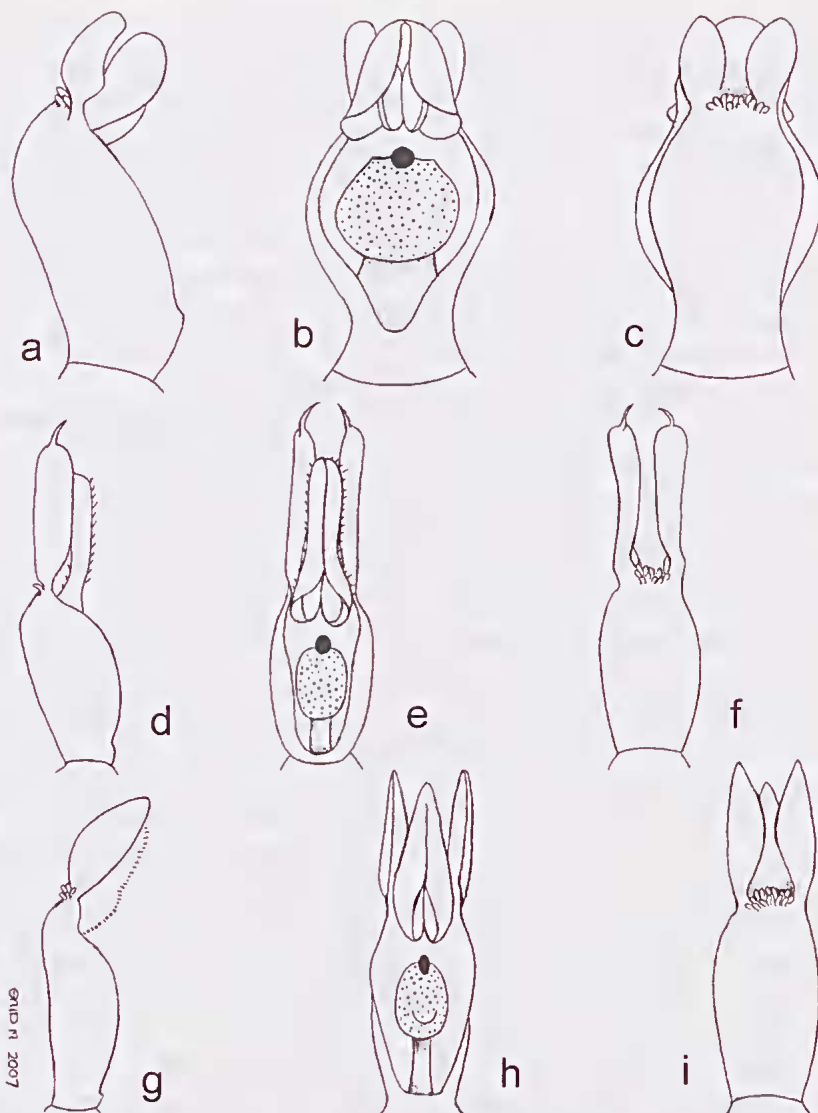


Figure 11. *Thelymitra matthewsii*: **a** column from side $\times 8$; **b** column from front $\times 8$; **c** column from rear $\times 8$.

Thelymitra apiculata: **d** column from side $\times 5$; **e** column from front $\times 5$; **f** column from rear $\times 5$.

Thelymitra variegata: **g** column from side $\times 5$; **h** column from front $\times 5$; **i** column from rear $\times 5$.

distribution, prefers heavy clay loam soils, has a more spiralled leaf and usually a single flower whose perianth has a different colour combination.

Mueller's *T. porphyrosticta*, that was described from specimens collected by Maxwell near Salt River and Kalgan in Western Australia, consists of two separate taxa. Those from Kalgan River are referable to *T. variegata* (lectotypified above) and those from Salt River to *T. spiralis* (rejected syntype). A specimen at

Kew (not seen by me) collected by Maxwell at Kalgan River is most likely an isolectotype (George 1971).

7. *Thelymitra speciosa* Jeanes, *sp. nov.*

Thelymitra. variegatae (Lindl.) F.Muell. *affinis sed flore plerumque unica, scapo brevior, segmentis floralibus praecipue purpureis. folio magis valde circinato e habitatione terrarum argillosarum differt.*

Type: Western Australia. W of junction of Twertup Ck & Fitzgerald R., 11.vii.1970, A.S. George 9904 (holotype PERTH 306967).

Illustrations: Hoffman and Brown (1998) page 455 (as *T. aff. variegata*); Heberle (1999) pages 73 (upper), 74 & 76 (all as *T. variegata*); Jones (2006) page 255; Brown *et al.* (2008) page 321.

Virtually glabrous, somewhat glaucous terrestrial herb. *Tubers* not seen. *Leaf* ovate-auriculate at base, narrowing abruptly and linear to linear-lanceolate above, 5–10 cm long, 4–10 mm wide, erect, spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins often lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. *Inflorescence* 5–20 cm tall, more or less straight. *Scape* 0.5–1.2 mm diam., wiry, green or purplish. *Sterile bract* solitary, lanceolate to ovate, 10–35 mm long, 3–8 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. *Fertile bracts* ovate to obovate, 5–15 mm long, 3–8 mm wide, green or purplish, margins connate at base, sheathing the pedicels, apex acute to acuminate. *Pedicels* 5–15 mm long, slender. *Ovary* narrow-obovoid, 5–10 mm long, 1.5–4 mm wide, curved. *Flower* solitary, rarely 2, 25–52 mm diameter, usually predominantly purplish, with broad, deep reddish-gold edges to the perianth segments and yellowish margins, spotted or blotched with purple, with a glossy iridescent sheen, opening freely in warm weather. *Perianth segments* 10–25 mm long, 2.5–10 mm wide, concave to almost flat, stiffly spreading; *dorsal sepal* ovate to ovate-lanceolate, acute to subacute, usually broader than other segments; *lateral sepals* lanceolate to linear-lanceolate, often slightly asymmetric, acute to acuminate; *petals* lanceolate to linear-lanceolate, often slightly asymmetric, acute to acuminate; *labellum* lanceolate to linear-lanceolate, acute to acuminate, smaller than other segments. *Column* erect from the end of ovary, 5–7 mm long, 3–5 mm wide, broadly winged, purplish; *post-anther lobe* vestigial, apical margin covered with an arc of digitate glands 0.4–0.7 mm long; *auxiliary lobes* absent; *lateral lobes* parallel or diverging slightly, oblong to elliptic, 3–5.5 mm long, 1–2.1 mm wide, straight to shallowly s-shaped, erect or obliquely erect, stipitate, fleshy, rugulose, yellow or orange. *Anther* inserted near apex

of column, obloid, 4–6 mm long, 1.5–2.5 mm wide, projecting forward at about 45° to column, yellow or orange, the connective produced into a fleshy beak 2–3 mm long, surface papillate, ventral surface channelled; *pollinarium* 2–3.2 mm long; *viscidium* elliptic, c. 0.8 mm long, c. 0.6 mm wide; *pollinia* coherent, cream. *Stigma* situated c. midway along column, orbicular to transversely broad-elliptic, 2.5–3 mm long, 1.8–2.5 mm wide, concave, margins irregular. *Capsules* not seen. (Fig. 8, Fig. 12 a–c)

Specimens examined: WESTERN AUSTRALIA: 5th Dongolocking Reserve, 25.viii.1984, G.J. Keighery 7238 (PERTH 278203); Tarin Rock Reserve, 26.viii.1984, G.J. Keighery 7245 (PERTH 302201); 3 km N of Gibson, 11.viii.1951, R.D. Royce 3621 (PERTH 278688); Slopes of Mt 8land, Fitzgerald River National Park, 12.vii.1970, G.J. Keighery 143 (PERTH 306975); c. 28 km W of Ravensthorpe and 13 km N of the Ravensthorpe–Ongerup Rd, 14.viii.1968, P.G. Wilson 7107 (PERTH 278238); 2 km SE of Mt Maxwell, 8.vii.1974, K. Newbey 4257 (PERTH 278653); 8oyatup Hill, 71 miles E of Esperance, N side of Fisheries Road, 4.x.1978, D.R. Voigt 63pp (PERTH 278211).

Distribution and habitat: Endemic to south-western Western Australia, between the Stirling Ranges and Lake Grace and extending eastwards beyond Esperance. Grows among low shrubs in heavy clay-loam soils that become water-logged in winter. Altitude: 10–300 m.

Conservation status: Widespread and conserved, but probably vulnerable. Suggest 3VC by criteria of Briggs and Leigh (1996) and Vulnerable (VU) by criteria of IUCN (2001).

Flowering period: June to early September.

Pollination biology: The large, freely opening flowers, functional viscidium, coherent pollen and sporadic production of seed capsules would indicate that this species is primarily entomophilous.

Notes: *Thelymitra speciosa* is most closely related to *T. apiculata*, *T. pulcherrima* and *T. variegata*. The former can be distinguished by a combination of characters including the tendency of the leaf to spiral more tightly, the usually solitary flower on a short scape, perianth segments that are predominantly purple in colour with broad reddish-gold edges and yellow margins and the lateral lobes on the column that are not apiculate at the apex.

Etymology: Latin *speciosa*, showy, handsome, beautiful; a very spectacular and showy species.

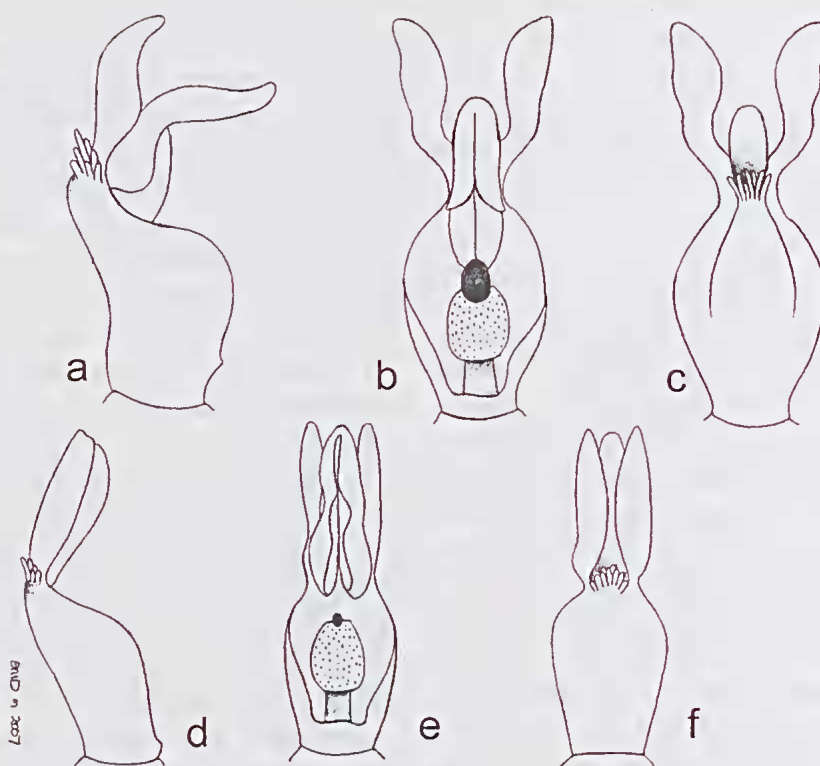


Figure 12. *Thelymitra speciosa*: **a** column from side $\times 5$; **b** column from front $\times 5$; **c** column from rear $\times 5$.
Thelymitra pulcherrima: **d** column from side $\times 5$; **e** column from front $\times 5$; **f** column from rear $\times 5$.

8. *Thelymitra pulcherrima* Jeanes, sp. nov.

Thelymitra. variegatae (Lindl.) F.Muell *affinis sed floribus minoribus praecocibus, sepalis et petalis colorum diversorum et habitatione septentrionali differt.*

Type: Western Australia. Eneabba–Leeman Rd, 6–7 km W of the Brand Highway, 26.viii.2001, C.J. French 2947 (holotype PERTH, isotypes MEL 2136734 & CANB).

Illustrations: Hoffman and Brown (1998) page 456 (as *T. aff. variegata*); Jones (2006) page 255; Brown *et al.* (2008) page 323.

Virtually glabrous, somewhat glaucous terrestrial herb. *Tubers* not seen. *Leaf* ovate-auriculate at base, narrowing abruptly and linear to linear-lanceolate above, 5–10 cm long, 4–10 mm wide, erect, almost straight to somewhat spirally twisted, canaliculate, fleshy, dark green with a purplish base, sheathing at base where margins often lobed and undulate, pubescent towards base with hairs mostly on veins and margins, apex subacute. *Inflorescence* 10–30 cm tall, more or less straight. *Scape*

0.5–1.5 mm diam., wiry, green or purplish. *Sterile bract* solitary, lanceolate to ovate, 10–35 mm long, 3–8 mm wide, green or purplish, closely sheathing at base, apex diverging from scape, acute to acuminate. *Fertile bracts* ovate to obovate, 5–15 mm long, 3–8 mm wide, green or purplish, sheathing the pedicels, margins connate at base, apex acute to acuminate. *Pedicels* 5–15 mm long, slender. *Ovary* narrow-obovoid, 5–10 mm long, 1.5–4 mm wide, curved. *Flowers* 1–6, 25–35 mm diameter, with sepals and petals of contrasting colour, glossy, opening freely in warm weather. *Perianth segments* 10–18 mm long, 2.5–8 mm wide, concave to almost flat, stiffly spreading; *dorsal sepal* ovate to ovate-lanceolate, acute to subacute, usually broader than other segments, central part purplish, edges yellow with strong reddish brown markings; *lateral sepals* lanceolate to linear-lanceolate, often slightly asymmetric, acute to acuminate, mostly yellow with strong reddish brown markings; *petals* lanceolate to linear-lanceolate, often slightly

asymmetric, acute to acuminate, mostly purplish with darker veins and blotches; *labellum* lanceolate to linear-lanceolate, acute to acuminate, smaller than other segments, mostly purplish with darker veins and blotches. *Column* erect from the end of ovary, 5–7 mm long, 3–5 mm wide, broadly winged, similarly coloured to petals; *post-anther lobe* vestigial, not hooding the anther, 0.4–0.7 mm long, apical margin covered with an arc of digitate to subglobose glands 0.4–1 mm long; *auxiliary lobes* absent; *lateral lobes* parallel or diverging slightly, oblong to elliptic, 4–5.5 mm long, 1–1.5 mm wide, straight to shallowly s-shaped, erect or obliquely erect, stipitate, fleshy, rugulose, yellow or orange. *Anther* inserted near apex of column, obloid, 5–6 mm long, 1.5–2 mm wide, projecting forward at about 45° to column, yellow or orange, the connective produced into a fleshy beak 2–3 mm long, surface papillate, ventral surface channelled; *pollinarium* 2.5–3.5 mm long; *viscidium* elliptic, c. 0.7 mm long, c. 0.6 mm wide; *pollinia* coherent, cream. *Stigma* situated c. midway along column, orbicular to transversely broad-elliptic, 2–3 mm long, 1.5–2 mm wide, concave, margins irregular. *Capsules* not seen. (Fig. 9, Fig. 12 d–f)

Specimens examined: WESTERN AUSTRALIA: 3 km SW of Mt Lesueur, 24.vii.1969, K.M. Allan 64 (PERTH 278718); Watheroo, 2.viii.1971, Mrs Scott s.n. (PERTH 27B645).

Distribution and habitat: Endemic to south-west Western Australia, between Lancelin and Dongara. Grows in open areas among shrubs in laterite soils or rarely sandy soils. Altitude: 10–100 m.

Conservation status: Apparently very rare and seldom collected, but moderately widespread and conserved. Suggest 3VC by criteria of Briggs and Leigh (1996) and Vulnerable (VU) by criteria of IUCN (2001).

Flowering period: June to early September.

Pollination biology: The large, freely opening flowers, functional viscidium, coherent pollen and sporadic production of seed capsules would indicate that this species is primarily entomophilous.

Notes: *Thelymitra pulcherrima* is most closely related to *T. apiculata*, *T. speciosa* and *T. variegata*. It can be distinguished from *T. speciosa* by its capacity to produce up to six relatively small flowers, from *T. variegata* by its generally smaller flowers whose sepals and petals are of strongly contrasting colour (the sepals predominantly yellow with reddish brown

blotches and the petals predominantly purple with darker veins and blotches) and from *T. apiculata* by the lateral lobes of the column that are not apiculate at the apex.

Etymology: Latin *pulcher*, beautiful; this is a very spectacular and showy species.

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